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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

TANG, KENNETH

ART UNIT PAPER NUMBER

2127

DATE MAILED: 10/19/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/939,235

Applicant(s)

ARMSTRONG ET AL.

Examiner

Kenneth Tang

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 August 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-32 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-32 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 10/15/01, 10/20/03, 1/16/04, and 3/23/04
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

1. Claims 1-32 are presented for examination.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 1-32 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention:

- a. In claims 1, 13, 16, 28, and 31, “waiting” is indefinite because it is not made explicitly clear in the claim language who or what is doing the waiting.
- b. In claims 1, 13, 16, 28, and 31, “deferring a yield” is indefinite because it is not made explicitly clear in the claim language who or what is doing the deferring.
- c. In claims 1, 13, 16, 28, and 31, “become ready to yield” (line 5) is indefinite because it is not made explicitly clear in the claim language whether or not yielding occurs immediately after it has become ready to yield. In other words, it is unclear when yielding occurs after it is found out that it is ready for yielding to occur.
- d. In claims 1, 13, 16, 28, and 31, “second thread becoming ready to yield” (lines 6-7) is indefinite because it is not made explicitly clear in the claim language whether or not the second thread is yielding. Claim 1 implies that it is

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ready to yield, but it's unclear if the second thread also yields when the first thread is yielding.

e. In claim 13, "subset" is indefinite because it is not made explicitly clear in the claim language what set the subset.

f. In claims 13 and 28, "abandoning the yield" is indefinite because it is not made explicitly clear in the claim language who or what is doing the deferring.

3. Claims 1-32 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential structural cooperative relationships of elements, such omission amounting to a gap between the necessary structural connections. See MPEP § 2172.01. The omitted structural cooperative relationships are:

g. In claims 1, 13, 16, 28, and 31, there is no structural relationship established with "sharing resources" (line 1) to anything else in the claim.

h. In claim 13, 28, and 31, there is no structural relationship established with "common virtual space" to anything else in the claim.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

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4. Claims 1-7, 9-10, 16-22, 24-25 are rejected under 35 U.S.C. 102(e) as being anticipated by Onodera (US 2001/0014905 A1).

5. As to claim 1, Onodera teaches a method for sharing resources on a multithreaded CPU capable of executing a plurality of threads (*page 6, [0056]*), the method comprising:

deferring (until the thread waiting operation is over) a yield (waiting) of a first thread executing on the multithreaded CPU while waiting for at least a second thread executing on the multithreaded CPU to become ready to yield (waiting thread of a notification) (*page 6, [0053]-[0054]*);

yielding the first thread in response to at least the second thread becoming ready to yield (transmission to a waiting thread of a notification) (*page 6, [0053]-[0054]*).

6. As to claim 2, Onodera teaches monitoring the plurality of threads for an occurrence (*page 3, [0020]*).

7. As to claim 3, Onodera teaches wherein the occurrence is a spin lock (general spin suspended lock) or an idle loop (waiting) (*page 6, [0059]-[0060]*).

8. As to claim 4, Onodera teaches making a yield call in response to the occurrence (waiting thread of a notification) (*page 6, [0053]-[0054]*).

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9. As to claim 5, Onodera teaches marking storage (special identifier has been stored) of the first thread in response to receiving the yield call to indicate that the first thread is ready to yield (*page 6, [0053]-[0054]*).
10. As to claim 6, Onodera teaches spinning the first thread while waiting for at least the second thread to become ready to yield (*page 6, [0053]-[0054], [0059]-[0060]*).
11. As to claim 7, Onodera teaches abandoning the yield call in response to detecting an event (waiting until a thread that holds the lock on the specific object is no longer present and until the bit that represents the lock type represents the first lock type) (*page 6, [0053]*).
12. As to claim 9, Onodera teaches returning control (an exclusive control state) of the first thread to an operating system in response to detecting the event (when the contention bit has been set) (*page 6, [0053]*).
13. As to claim 10, Onodera teaches saving the state (special identifier has been stored) of the operating system in response to detecting that at least the second thread is ready to yield (*page 6, [0053]*).
14. As to claim 16, it is rejected for the same reasons as stated in the rejection of claim 1.

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15. As to claim 17, it is rejected for the same reasons as stated in the rejection of claim 2.

16. As to claim 18, it is rejected for the same reasons as stated in the rejection of claim 3.

17. As to claim 19, it is rejected for the same reasons as stated in the rejection of claim 4.

18. As to claim 20, it is rejected for the same reasons as stated in the rejection of claim 5.

19. As to claim 21, it is rejected for the same reasons as stated in the rejection of claim 6.

20. As to claim 22, it is rejected for the same reasons as stated in the rejection of claim 7.

21. As to claim 24, it is rejected for the same reasons as stated in the rejection of claim 9.

22. As to claim 25, it is rejected for the same reasons as stated in the rejection of claim 10.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

23. Claims 8, 11-12, 23, 26-27, and 31-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Onodera (US 2001/0014905 A1) in view of Gillespie (US 6,269,391 B1).

24. As to claim 8, Onodera fails to explicitly teach wherein the event is a time-out or an external interrupt. However, Gillespie teaches a multi-processor using interrupts and time-outs (*col. 4, lines 27-49, col. 1, line 34*). It would have been obvious to one of ordinary skill in the art at the time the invention was made to include the features of interrupts and time-outs to the existing system because they improve control and scheduling abilities of the threads (*col. 4, lines 27-49*).

25. As to claim 11, Onodera fails to explicitly teach idling at least the first and second threads within a common virtual space in response to at least the second thread being ready to yield. However, Gillespie teaches a plurality of threads that are executed and yielded/suspended within a virtual machine (*col. 4, lines 27-49 col. 5, lines 64-67*). It would have been obvious to one of ordinary skill in the art at the time the invention was

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made to include the feature of idling at least the first and second threads within a common virtual space in response to at least the second thread being ready to yield to the existing system because this provides support for execution of code shared by two or more threads (*col. 6, lines 57-67*).

26. As to claim 12, Gillespie teaches idling all threads executing on the multithreaded CPU within the common virtual space (*col. 4, lines 27-49 col. 5, lines 64-67*).

27. As to claim 23, it is rejected for the same reasons as stated in the rejection of claim 8.

28. As to claim 26, it is rejected for the same reasons as stated in the rejection of claim 11.

29. As to claim 27, it is rejected for the same reasons as stated in the rejection of claim 12.

30. As to claim 31, it is rejected for the same reasons as stated in the rejection of claim 16.

31. As to claim 32, Onodera teaches wherein the signal bearing medium includes at least one of a recordable medium (shared memory) and a transmission-type medium (*page 6, [0056]*).

32. Claims 13-14 and 28-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Onodera (US 2001/0014905 A1) in view of Berger et al. (hereinafter Berger) (US 2003/0014466 A1).

33. As to claim 13, it is rejected for the same reasons as stated in the rejection of claims 1 and 7. However, Onodera fails to explicitly teach using a subsets for the plurality of threads. Berger teaches using subsets of processes or threads as compartments in order to gain the advantage of organization, containment and security (*page 3, [0035]*). It would have been obvious to one of ordinary skill in the art at the time the invention was made to include the feature of using a subsets for the plurality of threads to the existing system in order to obtain the advantage described above.

34. As to claim 14, it is rejected for the same reasons as stated in the rejection of claim 1. Onodera teaches the yielding aspect, while Berger teaches subset of threads (*see rejection of claim 1 above*).

35. As to claim 28, it is rejected for the same reasons as stated in the rejection of claim 13.

36. As to claim 29, it is rejected for the same reasons as stated in the rejection of claim 14.

37. **Claims 15 and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Onodera (US 2001/0014905 A1) in view of Berger et al. (hereinafter Berger) (US 2003/0014466 A1), and further in view of Gillespie (US 6,269,391 B1).**

38. As to claim 15, Onodera in view of Berger fails to explicitly teach wherein the event is selected from among a group consisting of a time-out, an I/O interrupt and a combination thereof. However, Gillespie teaches a multi-processor using both interrupts and time-outs (*col. 4, lines 27-49, col. 1, line 34*). It would have been obvious to one of ordinary skill in the art at the time the invention was made to include the features of interrupts and time-outs to the existing system because they improve control and scheduling abilities of the threads (*col. 4, lines 27-49*).

39. As to claim 30, it is rejected for the same reasons as stated in the rejection of claim 15.

Conclusion


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kenneth Tang whose telephone number is (571) 272-3772. The examiner can normally be reached on 8:30AM - 6:00PM, Every other Friday off.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Meng-Ai An can be reached on (571) 272-3756. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Kt
9/28/04


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